HENRY/TEMPO SOLID STATE AMPLIFIERS GENERAL INFORMATION SHEET

TYPE ACCEPTANCE INFORMATION

With the installation of commercial filtering, these amplifiers are type accepted for operation under all applicable parts of land mobile and fixed base station services. However it is the responsibility of the technician installing and tuning the amplifier to hold the proper class of FCC commercial license and to be familiar with the rules and regulations pertaining to the power output permissible under the class of station license the amplifeir is to be used with.

Also, it is extremely important to consult the specifications published by the manufacturer of the exciter. This will insure that the power level which the transceiver will be raised to will not invalidate its full acceptance because of spurious content or frequency stability.

The technician must determine what the maximum power level is in the class of operation he intends to use the amplifier. We suggest that the technician consult the FCC publications regarding the regulations.

For all regulations calling for the measurement of the final input power, consult the sections describing alignment and power adjust on the attatched technical sheet. To comply with any regulation regarding low power capability see the section describing the CONTROL connection.

The content of harmonic spurious signal generated by this amplifier is attenuated far in excess of the FCC requirements for the service that the amplifier is type accepted. The attenuation of these spurious signals is guaranteed in the design of the amplifier as well as by the use of a band pass filter on the output of the amplifier.

UNPACKING AND INSTALLATION

The solid state amplifier you have purchased was tested and aligned at the factory for the frequency you requested. Further alignment may be necessary to match the antenna in you installation. Please read the alignment procedure carefully as described on the technical information sheet. Do not try to realign the amplifier unless the output power is below specifications. The solid state devices in your amplifier are easily damaged if they are serviced incorrectly. The equipment warranty can not cover damages caused by negligent service, therefore we recommend that all service be accomplished by a knowledgeable technician.

Remove the amplifier from its shipping box and packing material and examine it for visible damage. If the equipment has been damaged in shipment, save the box and packing material and notify the transportation company immediately. DO NOT put the amplifier into service if it has been damaged.

The following accessories should be included with the amplifier. A drive cable, a DC cable, an instruction manual, a warranty card, and an RF OUT plug. Special cables or connectors can b supplied on request. When installing the amplifier, keep in mind that the equipment should be mounted as closely as possible to the 13.8 VDC power source to prevent low output caused by a voltage drop in the DC cable. We recommend installation inside the vehicle for mobile installations. The red power lead connects to the battery's positive (+) terminal and the black DC lead connects to the battery's negative (—) terminal. Figure 1 is a diagram of the necessary interconnections.

The DC power cables should be connected directly across the battery to prevent damage to the ignition system of the vehicle caused by the high operating current of the amplifier. Screw the amplifier into position at the location desired and plug the DC power cable into the appropriate connector on the amplifier.

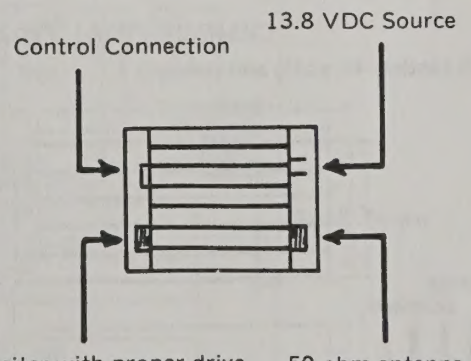
Connect the RF OUT coax connector to an appropriate antenna (50 ohms) using coaxial cable. These amplifiers, as with all solid state devices, operate with maximum output when operating into a 50 ohm load with a low SWR. The SWR of the antenna should be measured and adjusted for a minimum at the desired operating frequency. Also remember that long coax leads cause significant power losses at UHF and VHF frequencies. Connect the supplied drive cable to the exciter and to the RF IN coax connector of the amplifier.

The mobile installation has been completed when all of the described connections have been made.

For base station installations, the amplifier must be connected to a 13.8 VDC source (either a storage battery, or an AC to DC power converter) which is capable of supplying the necessary current.

The amplifiers are designed to key into transmit automatically whenever they are driven with nominal excitation. The CONTROL jack, described on the accompanying sheet, disables the automatic keying circuit for low power operation.

For optimum output, remember that the voltage at the amplifier, the drive power, the length of the coax lead, and proper antenna tuning are all important operating parameters. Complaints of low output can generally be traced to an improper installation.



FOR MAXIMUM OUTPUT POWER

MAXIMIZE YOUR OPERATING PARAMETERS

Figure 1. Installation Diagram.

SERVICE AND REPAIR INFORMATION

Be certain to heed the warnings regarding damage caused by negligent servicing. Be certain to use replacement parts of equal or better ratings when servicing the amplifier.

When ordering replacement or spare parts for your equipment, be sure to specify the model number of the amplifier, the serial number, the schematic number of the part, and a description of the part. This information will aid in fast and correct handling of all parts orders.

Should it become necessary to ship the amplifier to a service center for repair, repack the transceiver in its original carton (or an equivalent box with adequate packing to prevent shipping damage).

After the amplifier has been properly packed, return the equipment to the service center prepaid. Be certain to insure the package for its full value. Also include a short note describing the problems involved. Any amplifier returned for warranty repair should include some proof of the purchase date.

PLEASE NOTE . . . All rated amplifier outputs are measured under laboratory conditions with a proper drive level. If the amplfiiers are operated with improper drive, at a voltage less than 13.8 VDC, with mismatched cables, or with a mismatched antenna, the output will be less than maximum.

HENRY RADIO

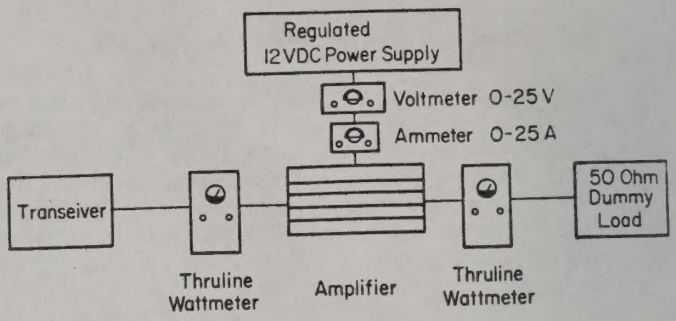


Figure 2. Test Circuit Block Diagram.

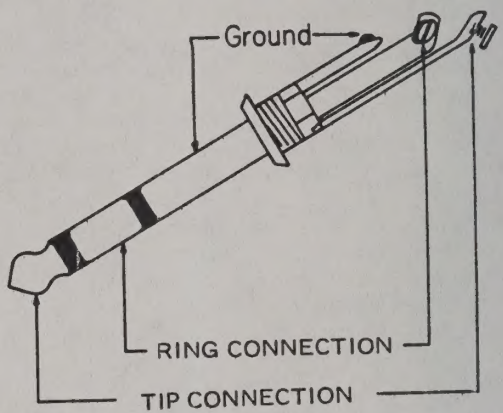
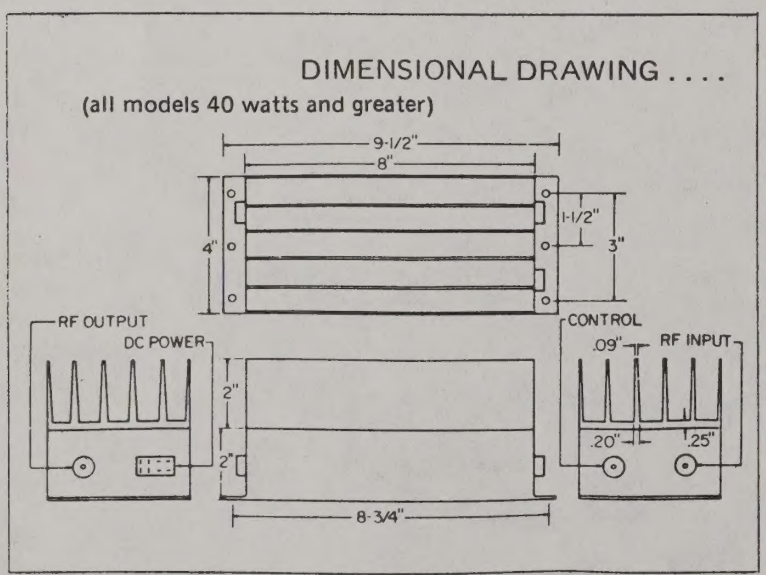
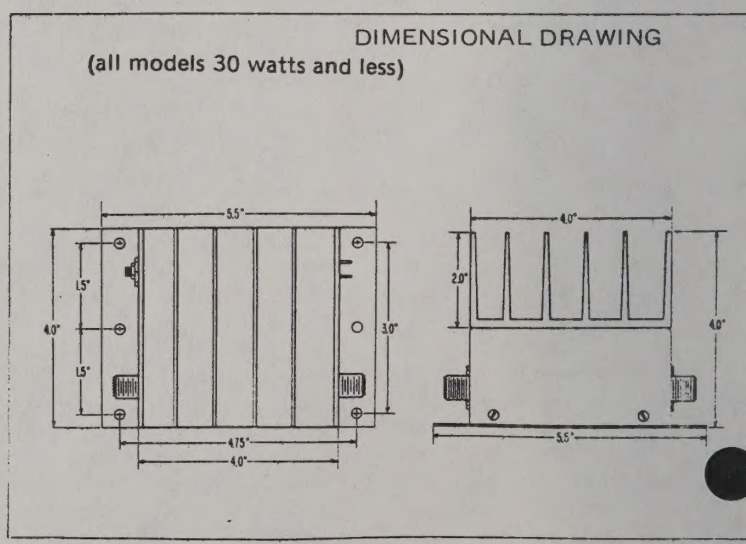


Figure 3. Amplifier Control Plug.





100 WATT UHF AMPLIFIER INSTRUCTION SHEET

CIRCUIT DESCRIPTION

The circuit diagram of the C100D02 is shown (over). All of the 100D series are built on a modular, building block technique. The C100D02 consists of a relay board and four amplifier boards.

On the relay board, RF from the antenna connector goes directly through the relay into the exciter during receive. During transmit the RF from the exciter enters the amplifier through the RF IN connector, creating a DC voltage across D2. This voltage is amplified by Q1 to trip relay RY1 causing the signal to enter the amplifier section. Grounding the base circuit of Q1 disables the sensing circuit to turn the amplifier off.

The C100D02 uses four amplifier boards. Refering to the schematic, PB2 through PB5 are nearly identical. PB2 uses a CM10-12A transistor, PB3 uses a CM45-12A transistor, and PB4 and PB5 use a CM60-12A transistor.

On each board the 50 ohm input is matched through the printed circuit inductance and 3 mica chip capacitors. The DC return for the base is bypassed and protected by a ferrite bead to prevent RF feeding back to the DC line. The center frequency of the input circuit is factory set by selection of the position of the two capacitors on the base circuit of the transistor in relation to the printed circuit inductor.

The collector circuits includes a printed circuit inductance which is resonated by 4 mica chip capacitors. As in the input circuit, the center frequency is determined by proper positioning of the two mica capacitors at the collector junction of the transistor. This output circuit forms a band pass filter which serves to attenuate harmonics about 50 db below the fundamental carrier level.

The amplifiers are inherently broadband in their design and will operate plus or minus 5 MHz from their center frequency with less than 1 db decrease in the output.

Power and impedance matching is done by the coax leads between the boards. These are two quarter wave 72 ohm lines. This technique is used for both interstage and output coupling on the amplifier. RF INPUT and RF OUTPUT connectors are type UHF, the 13.8 VDC connector is a 8-pin Jones plug, and the CONTROL jack is a 3/16 stereo phono jack.

F1 is a 30 amp protection fuse, inside the amplifier, D1 is a reverse polarity protection diode, and PB6 is a stripline band-pass filter made of 5 mica chip capacitors placed on a metal base.

The C100D10 is identical to the C100D02 except PB2, the pre-driver board, is omitted.

The C100D30 is identical to the C100D02 except PB2, the pre-driver board, is omitted, and Q3 is changed from a CM45-12A to a CM60-12A transistor.

TESTING AND ALIGNMENT

The broadband design and fixed tuning preclude any field adjustment of the amplifier. If it becomes necessary to shift the center frequency of the equipment beyond its bandpass, the amplifier should be returned to the manufacturer. However, the broadband design of the amplifier makes it unnecessary to retune unless the frequency of operation is changed by at least 10 MHz.

HENRY RADIO
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TEST PROCEDURE

Connect the amplifier and its exciter as shown in the block diagram of Figure 2. Be certain that the DC power supplied to the amplifier is a regulated 13.8 VDC from a source capable of supplying at least 25 amps.

Be certain that the RF output of the transceiver does not exceed the rated input of the amplifier (5 watts for ..D02 amplifiers, 20 watts for ..D10 amplifiers, and 40 watts for ..D30 amplifiers). Connect the thruline wattmeter between the transceiver and the amplifier, energize both units and verify the input VSWR is less than 2:1. At UHF frequencies, the length of the drive cable is a very important factor in determining the VSWR, and in general, a change in the length of the input cable will change the VSWR reading.

Connect the wattmeter between the amplifier output and the antenna (or dummy load) and key the exciter to verify proper output power.

POWER ADJUSTMENT

The wideband design and fixed tuning eliminates all tunable components. A 3 to 6 db decrease in power output may be accomplished by decreasing the input drive with the use of a suitable attenuator. This will not degrade the spurious response or cause oscillation in the amplifier.

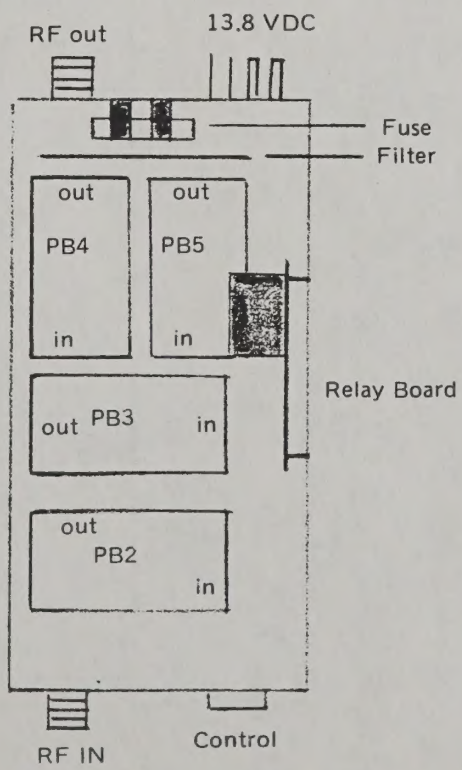
Input power to the amplifier may be measured directly by breaking the B+ lead to the amplifier's output stage and inserting a 25 amp meter.

CONTROL AND MONITOR CONNECTOR

A dual function control jack is provided on each amplifier to allow remote control of the amplifier.

Grounding the control line (ring), as shown in Figure 3, disables the amplifier, connecting the transceiver directly to the antenna.

PARTS LOCATION



C1, C2. . . . . .05 mf, ceramic disc.
C3, C17, C27, C37, C47 . . . . . .001 mf, ceramic disc.
C4, C18, C28, C38, C48 . . . . . .01 mf, ceramic disc.
C9, C19. . . . . 5 pf, mica chip - J101-5.
C10, C20, C23
C29, C39, C30, C40. . . . . 25 pf, mica chip - J101-25.
C11, C21, C31, C41. . . . . .15 pf, mica chip - J101-15.
C12, C13, C15
C25, C35, C45 . . . . . .10 pf, mica chip - J101-10.
C14, C24, C34, C44. . . . 150 pf, mica chip -J101-150.
C16, C26, C36, C46. . . . . 25 mf, 50 volt, electrolytic.
C22, C32, C42, C33, C43 . . .35 pf mic chip - J101-35.
C50, C51, C52
C55, C56, C57 . . . . . 20 pf, mica chip - T101-20
C49, C53, C54, C58. . . . . 10 pf, mica chip - T101-10.

F1 . . . . . .3 AG, 30 amp.

Q1 . . . . . 2N2222A
Q2 . . . . . .CTC CM10-12A (C100D02 only).
Q3 . . . . . CTC CM45-12A (C100D10).
Q3 . . . . . CTC CM60-12A (C100D30).
Q4, Q5 . . . . . CTC CM60-12A.

Relay . . . . . .Guardian 1365-PC-2C.

D1 . . . . . .GE-509 or equivalent.
D2, D3 . . . . . .1N4148.

RF Input. . . . . UHF type.
RF Output. . . . . UHF type.
13.8 VDC . . . . . .Jones P-308-CCT.
Control . . . . . .Switchcraft S-12B (matches S-260).

R1 . . . . . .470 ohms, 1 watt, 10%.
R2, R3, R4 . . . . . 1 K ohm, ½ watt, 10%.
R5 . . . . . .10 K ohms, ½ watt, 10%.
R6 . . . . . .3.3 ohms, ½ watt, 5%.

PB1 . . . . . Assembled Relay Board.
PB2 . . . . . .Assembled Preamp. Board (C100D02).
PB3A . . . . . .Assembled Drive Board (C100D10).
PB3B . . . . . .Assembled Drive Board (C100D30).
PB4, PB5. . . . . .Assembled Power Output Board.
PB6, PB7. . . . . Assembled Filter Board.

L1 . . . . . .2 turns on lead of R6.
L2, L3, L4Miller 9250-332.